SAFETY-RELEASE BINDING

Safety-Releas Binding

Field of the Invention

The invention concerns a safety-release-binding for a ski, skwal or a snowboard, which can be mounted as interface (universal safety release mounting plate) under all bindings and/or boots (esp. for snowboards).

Background of the Invention

Snowboard safety bindings yet are not designed or developed by the industry and are ignored respectively are stigmatized by statements like as they are not welcome on the market or by other statements like not function able, too expensive so that they are not designed and developed yet, but by us. After a first few alpine-snowboard designs there has never again been designed or developed a snowboard safety binding for free-style snowboarders, or such a free-style binding.

Safety-release-bindings for skis are generally very well known in multiple versions. They consist of a so-called toe-release mechanism, which allows a rotational release for torsional loads and a so-called heel-release-mechanism, which allows a lift release for vertical loads on the ski. Such bindings are also still used for new carving-skis. For snowboards and so called skwals (little larger monoski) still no safety-release-bindings are used, though in spite of the rising number or accidents causing severe injuries no constraining rules are set from official institutes. Because of the lacking space at the toe and heel location no regular ski-binding can be used as snowboard safety binding and so the release mechanism has to be placed to a different location, e.g., under or to the side of the boot. Furthermore a snowboard-release-mechanism needs also a releasing direction on side-ways, i.e. in X-direction. So the technical, patent, market and marketing problems are enormous and they are all so-called killing factors as well as the novelty, complexity and convincing issue for the launch of a new snowboard safety binding. For these reasons snowboard safety bindings have not been established successfully yet. Also patents have a major effect on the launch of new products just like this, because big labels do not want to

pay to the inventors and designers royalties only for their patents and on the other hand for the lacking patent thē big labels cannot produce these good products, but they would maybe only license a perfectly functioning product eventually, because the risk is too high for these big labels to buy a license of a technically not yet or even never working product idea.

From U.S. Patent No. 6,428,032 a snowboard safety binding is known with a first part attached to the snowboard and a second part attached to the boot, which first and second parts are connected by a clamping mechanism, which is releasing under a dangerous load or impact. The clamping mechanism comprises at least two parallel positioned compression springs, which have a bolt at their ends, wherein each of said bolts mesh with an engaging element provided at the other of said first and second parts, and wherein a pressure element is provided between said compression springs and said bolts at one end of said springs, in order to set a trigger threshold for release of said locking mechanism for rotation in any sideward, forward and backward and in a longitudinal direction, i.e., by rotation about the foot joint of the snowboarder and wherein insert means are provided on said engaging elements, in order to set the trigger threshold for release of said locking mechanism about the longitudinal direction of the shin bone of the snowboarder.

This well-known snowboard binding has the disadvantage that it fits and works only with a limited little number of compatible boots on the market. That is why for hard-boots and soft-boots two different kind of bindings have to be manufactured. Thus, there is no single multi-compatible release- or just binding-system available for all different snowboard-, boot- and binding-systems. Such multi-compatible release binding systems are also not available for skwals or skis. In the season 2001/2002 all known worldwide sold snowboard-bindings have the disadvantage to feature no safety-release mechanism. As mentioned, because for the side-ways snowboard riding position and the impossibility to put a release-mechanism at the toe or heel location of a snowboard safety binding, no ski binding can be used for snowboards. Unfortunately it is also almost impossible to put the release-mechanism under the boot or in the sole cavity of snowboard-boots, because too many different boot types are existing with different or even no sole cavities. There is only the possibility left to

use the principle of the Miller Z-binding and to add a mechanism as described in U.S. Patent No. 6,428,032 for a functioning step-in.

Summary of the Invention

Thus, it is an object of this invention to create a universal mounting binding, or –plate, a so-called interface plate, which can be used for skis, skwals and esp. snowboards, where it can be mounted under any known snowboard binding.

This and other objects are solved by the safety binding as defined in the independent claims. Advantageous embodiments of the invention are mentioned in the dependent claims.

The invention is based on the idea that under any existing ski- or snowboard binding a releasing universal interface plate is mounted, which has now the function of the safety-binding that is guaranteeing the safe release in case of any dangerous fall, crash, load or impact. It is no disadvantage to have a slightly higher riding position on this additional plate. There is even some advantage involved. So for ski bindings an upper limit of this top height had to be set, because a higher binding was requested, as it is advantageous to have a slightly higher toe position in respect to the heel position.

Brief Description of the Drawings

The invention and its advantageous embodiments are described hereinafter with reference to the attached schematic drawings. They show:

Figure 1 A perspective view of the interface (1) between (free-style) snowboard-binding (B) and snowboard (A);

Figure 2 A cross view of the interface (1) with separation in top-part (2), bottom-part (3) with stop-brake (7), stop-brake-bar (4), spring-box (15), engaging element (16) and mounting-ground-plate (10);

Figure 3 A top view of the interface and the stop-break-turning-position (70);

Figure 4 A connected interface (universal mounting plate) for on a snowboard and under a regular snowboard binding with 3D and 4x4 ground-plate;

Figure 5 The bottom-part of the interface with stop-break-ground-plate (black), spring-box (next to that) and mounting -ground-plate (within that);

Figure 6 The top-part and the bottom-part of the interface;

Figure 7 The "separate able" release-mechanism (engaging element and spring-box) of the interface;

Figure 8 The release-mechanism in the two single separated "separate able" parts, which both with the top- and bottom-part of the two plates of the interface can be firmly connected;

Figure 9 The top-plate of the interface with the attached engaging element in bottom view;

Figure 10 The parts and elements of Figure 9 in top view;

Figure 11 The modification of the interface as free movable foot-and-socket-joint for the measurement of the release torques for the later adjustment of the release setting screws of the release-mechanism;

Figure 12 The top-part of the interfaces as (180° degree turn able carving- and free-style-) ski binding in top-view;

Figure 13 The same part of Figure 12 in bottom-view;

Figure 14 The top-cross-view CAD-drawing of the interface;

Figure 15 A perspective CAD drawing of the carving-ski interface;

Figure 17 A bottom view of the cavity in the sole of a boot with the attached engaging element and with it the pull-out wire-lever;

Figure 18 A rear view of a boot with engaging element and with it the pull-out wire-lever;

Figure 19 A pull-out wire-lever with multiple kinks for leading the wire around the foot-ankle and for leading the wire around outside or inside the soft-snowbaord or hard-ski-boot;

Figure 20 A setting of the enlarged high-backs with a turning-axis behind the boot and with moveable tapes as side-stabilizations;

Figure 21 A fixing-ground-plate with 3D and 4x4 shifting hole-pattern;

Figure 22 A setting of the weight adjusting mechanism;

Figure 23 The whole spring-box with weight adjusting mechanism, turning clapping lever, safety-lock and so on;

Figure 24 Multiple views of the interchangeable binding-version with the elastic tape, stop-brake and –hook;

Figure 25 A perspective CAD-drawing of the fastening respectively suspension plate for the interface or the interchangeable binding-version;

Figure 26 A step-in and pull-out mechanism for the second SNAB-System release mechanism version;

Figure 27 First SNAB-System step-in mechanism for the kick plate of the Miller Z-binding;

Figure 28 A step-in and pull-out mechanism for the second SNAB-System with integrated damping system; and

Figure 29 A power plate for a safety-interface-plate or under a –binding.

In the drawings, the same reference signs are used for the same elements if not explicitly marked or mentioned.

Description of Preferred Embodiments

Figure 1 shows the over-all in-use setting of the universal mounting plate or so called interface 1 as it is fixed by screws between snowboard A and binding B.

Figure 2 shows the construction of the interface how an engaging element 16 of the release-mechanism is attached in the cavity by screws into the inserts provided in the top-part 2 of the interface 1. The inserts 16 serve for the mounting by screws of the 3D and 4x4 hole pattern of the fixing-ground-plate 6 of any (snowboard-) binding B. The spring-box 15 of the "separate able" release-mechanism lies under the engaging element 16, which is clamping onto this spring-box 15 of the release-mechanism by a moveable part 29 of the engaging element 16. The spring box 15 is fixed by a screw respectively a turning-clapping-lever 38 into the insert 36 of the fixing-ground-plate 10. So at this same time the spring-box 15 presses with its cavities 13 the bottom-part of the interface with the stop-brake on the board A. By loosening slightly the screw or by opening the turning-clapping-lever 38 and so lifting the bottom-part from the fixing-ground-plate 10 and the snowboard A it is possible to change the angle of the whole interface 1 with its binding B in respect to the snowboard A in 360° degree, because so the star-shaped grooves 14 of the spring-box can be fixed in a different angle on the star-shaped grooves 12 of the fixing-ground-plate before fastening again (see also figure 5).

Figure 3 is a cross view of the top-part 2 of the interface 1. It shows where the stop-break-position 70 for any angle-adjustment of the interface 1 is placed, either if the interface has a 90° degree position on a 28cm large free-style snow-board or a 60° degree position on a 25 cm large free-ride snowboard or a 45° degree position on a 22 cm large free-ride snowboard or a 30° degree position on a 18 cm large alpine-race snowboard or a 0° degree position on a 12 cm large skwal. I.e. figure 3 shows that the stop-break 7 turns or flips by a safety-release or a pull-out or before a step-in over this special point 70 for any kind of ski, skwal or snowboard, no matter if 10 cm, 20 cm or 30 cm large and with any foot-angle-adjustment of the interface 1 between 0° and 90° degrees with or without an additional adjustment of the stop-brake hook 71 although such a length adjustment is possible by the multiple holes 72 for the therefore needed/provided screws.

Figure 4 is again the interface 1 in perspective view with top-part 2, bottom-part 3 and stop-break-bar 4. The top-part 2 provides at least four (plus three) inserts 17, in which screws 5 of the round ground-plate 6 with (4x4 or 3D hole-pattern) fit. With the 4x4 or 3D hole-pattern of the round ground-plate 6 any regular snowboard binding for any boot can be mounted on the interface 1. (I.e. free-style-bindings for soft-boots, plate-bindings for hard-boots or also the new step-in bindings for soft or semi-soft free-ride boots.) The stop-break-bar is moveable attached by two wires 7 at the bottom-part 3 or top-part 2 of the interface 1.

Figure 5 shows the bottom-part, which has a central cross-shaped hole 8 where the spring-box presses down the bottom-part onto the fixing-ground-plate 10. This fixing-ground-plate 10 is mounted with screws 11 on the snowboard. This fixing-ground-plate 10 has star-shaped grooves 12 in which compatible star-shaped grooves 14 of the spring-box fit (see Figures 7 and 8). So any angle of the foot can be set on 5° degree around 360° degree.

In Figure 6 are shown face to face the top-part 2 with the engaging element 16 of the release-mechanism and the bottom-part with the spring-box 15 of the release-mechanism. The engaging element 16 is attached by screws in the inserts 19 of the top-part. The spring-box is attached with a screw or a turning-clapping-lever 38 in the inserts 36 of the fixing-ground-plate. So at a safety-release the top-part with engaging element 16 (left) and bottom-part with spring-box 15 will separate according figure 3. This release-mechanism (engaging element and spring box) are similar constructed and have the same function as it is comprehensively described in U.S. Patent No. 6,428,032, the entire disclosure of which is incorporated into this specification by reference, where we related explicitly.

Figures 7 and 8 show exactly the release mechanism with engaging element 16 and spring box 15 in connected and disconnected respectively separated state.

In the Figures 9 and 10 the top-part 2 of the interface 1 is shown as a complete so called plate safety binding for hard-boots. On the top-part 2 is a fastening respectively suspension plate 41 mounted/attached, which is turn able around an joint 42 in the length direction of the interfaces 1 (compare to CAD-drawing 25).

Furthermore the fastening respectively suspension plate 41 is suspended on rubber elastic spacer washers on the top-part 1. In the front of the interface is a toe-lever 45 attached and in the rear on the fastening respectively suspension plate 41 a heal-lever 44.

Figure 11 shows the interface 1 with a spring-power-balance 50 (or alternatively rubber ring with a scale) as foot-ankle torque measuring device, which is attached at the top-part 2 by a lever 51. The bottom-part 3 is then set right-angled to the top-part, i.e. the bolts are not jet put in the engaging element. In this position the release mechanism is like a free move, pivot or rotate able foot-and-socket-joint. This foot-and-socket-joint consists of a hemispherical top, which is set on the spring-box 15 and fits into the engaging element 16. So if the bottom-part is fixed - for instance on the snowboard- and the top-part is hold firmly while the snowboarder or sports-man is standing in riding position in the binding on the interface on the snowboard and while in opposite direction is pulled at the lever and spring-power balance by the sales-man (in the at least the 3 adjustable directions) the release torques can be easily measured and then adjusted on the adjusting means at the engaging element respectively at the spring-box. When pulling on the measuring-device the individual releasing torque is measured respectively found at the point when the sports-man starts to turn his foot at his maximum muscular generated power respectively torque, while all leg muscles try to hold firm his original riding position. The torque measurement device can be also an interface plate (connected to any ski-snowboard-binding or other) connection to the foot or feet (extremities, belts or center of gravity etc.) of the sports-man. This interface plate allows next to the yet described mechanic lever measurement also by an electronic device the measurement of the torques of the sports-man in all three directions! As well as when the center of pivot lies on the toe in the middle of the foot or the heel. The adjustment of the release mechanism takes place at the screw 20 of the spring box and the setting screws 99 in the trough 32 of the engaging element 16 according to U.S. Patent No. 6,428,032.

Figure 12 and 13 show a longer interface plate 55, which can be used as a free-style ski binding. This long plate 55 has the same function as the top-part 2 for snowboard-bindings. It has next to the long thin shape a rectangular hole 54 for the stop-bar 4 and two pairs of long attachment holes 57 and 58. In the long holes 57 is a toe-claw

60 and in the long holes 58 a heel-step-in mechanism 61 for ski boots attached. The toe-claw 60 and the step-in mechanism 61 replace the toe- and heel-release mechanism of regular well-known ski-bindings, while the engaging element 16 of the whole release mechanism is integrated in the middle of the interface-plate 55. The spring-box 15 is again with the bottom-part and stop-break mounted on the ski according to the snowboard.

Figure 14 is again a further precise CAD-drawing of the interface 1 in top-view.

Figure 15 is a CAD cross-view of the interface 1 along the line A-A in figure 14. In both figures 14 and 15 inserts 17 are attached to the interface 1 for the mounting of a binding B with 3D or 4x4 hole-pattern.

Figure 16 is again a precise perspective CAD-drawing of the longer interface plate 55 as shown in the Figure 12 and 13.

Figure 17 and 18 show a free-ride snowboard-boot with a cavity in the sole in which the engaging element 16 of the interchange able binding version is fixed with screws. With this interchange able binding version the direct safety release and a direct step-in and step-out on the spring-box is feasible by the engaging element attached in the sole cavity of the snowboard-boot. This snowboard-boot must be strengthened by a so-called I-spine (an internal high-back). For the step-out it has to be pulled the lever 51, which is then opening the engaging element 16.

Figure 19 shows the lever 51. This 5-6 mm thick wire lever is attached left and right along the calf of the leg either outside the boot or inside between inside-boot and outside-boot, why it has a couple of kinks, which lead it behind the foot ankle so that it does never touch or even hurt the foot, ankle or calf.

Figure 20 shows for the interchange able binding version an in its width enlarged high-back 90 without firm side-stabilizations, but with a turning- axis behind and below the heel of the boot. For the substitution of the firm side-stabilizations for the free rotation release of the boot are soft move able textile tapes 92 used from the bottom-part 3 to the hooks 93 for the adjustment of the angle of the high back. Figure

21 shows the ground-plate 10, which has a special pattern of length-shaped holes for the mounting and changing of the length position of the interface 1 on the snowboard A. These length-shaped holes 80 are arranged like that the interface 1 can be mounted on a 3D and 4x4 mounting pattern of any snowboard, while the length position can still be changed and set differently with both patterns. These length-shaped holes 80 are arranged uniquely and defined exactly by the central 3D mounting pattern 81, which is move able for three holes (with 4mm distance an 6mm diameter) to the left and right. In the upper left hole from the central 3D mounting pattern is one hole to the left the most left hole 82 for the 4x4 mounting hole-pattern, which is lied in the bottom length-shaped hole of the 3D pattern and two new forth and fifth one. From this position the 4x4 pattern is move able for 4 holes to the right. So arranged like this the fife length-shaped holes 80 fit into a round ground-plate 10 with 90mm diameter.

Figure 22 shows the two counter plates 24 and 26 for the adjustment of the spring force with the screw 76, which has a ring 76 for that the plate 24 is pressed further or closer away from the plate 26 by turning that screw 76 in the thread of the plate 26. This is for that the over-all length of the springs will always keep the same length and that so the bolts 22 never will be blocked in their holes 23 while a release is made.

Figure 23 shows once again the spring-box 15 with the turning-clapping-lever 38 and a little lock 100 in a loop 37. The function of the little lock 38 in the loop 37 is that the bottom-part 3 of the interface cannot be screwed off from the ground-plate 10 respectively from the snowboard and that for the interchanged binding version the engaging element is not to be able to engage on the spring box. With these two functions a very good theft-lock is provided. And furthermore on this and on a second very good recognizable position on the interface 1 a number or an alphanumeric or a bar code with additionally the year of the production is located respectively attached by a laser-printed-adhesive-tape. The number or the alphanumeric or the bar code is saved with the name of the owner of the binding on a server in the Internet. To lock the loop 37 is very useful for the reason that stolen interfaces 1 are very easily recognizable, because the number would be destroyed when the little lock is torn off with violence from the loop 37. The idea of the loop with a number is first that nobody wants to be the easy recognized rider of this then as well recognizable stolen

product, which has furthermore also no number attached any more and so the thief is riding with a product like driving a car without plate. Second in the loop is an electric circuit and in case if the lock around the loop is torn off the loop respectively the electric circuit connected or integrated in a microchip will be destroyed and an additional alarm signal will be transmitted to the number in the Internet or the mobile phone of the owner of the binding. The transmitter can also be used as tracking system for lost bindings or riders in avalanches. Third in case of an injury the insurance companies will report the injured snowboarder to a statistic, which we will only accept to be made with the true owner and rider of our only and patented interface and snowboard safety-binding, for that the insurance companies have the new exact safety-binding-risk-statistic in respect to the old very well known snowboard-binding-risk-statistic to pay back to the owner of the interface and snowboard safety-binding the difference of the so easily calculated injury risk reduction. Third this number or the alpha-numeric- or the bar-code is very useful for to have a protection from cheap illegal Asian or Eastern Europe copies of the interface and snowboard safety binding. This combination of a lock able loop and a number or the alpha-numeric- or the bar-code, which is saved on a server in the internet, can also be applied for locks, chains, bicycles, kick-board, cars, ships, planes, real estates and for ski and ski-bindings of course. Furthermore in this loop a wire or a so-called electric circuit can be integrated for the turning off of motors or turning on of alarm-sirens or other electric products.

Figure 24 a, b and c show an interchange able binding-version, where the engaging element is screwed off from the inserts 19 in the top-part 2 of the interface 1 and therefore is screwed on a boot with a corresponding opening in the sole. I.e. with this interchange able binding-version without top-part 2 the bottom-part 3 can be used directly as step-in and step-out snowboard safety binding according to U.S. Patent No. 6,428,032. For this step-in and step-out of the interchange able binding-version a 5-6 mm thick wire lever 51 is used respectively placed left and right along the calf of the leg either outside the boot or inside between inside-boot and outside-boot, why it has a couple of kinks, which lead it behind the foot ankle so that it does never touch or even hurt the foot, ankle or calf. Furthermore this wire-lever 51 is used for the measurement of the torques of the snowboarder by attaching at the interface top-part

(already described above) and so for the adjustment of the release mechanism accordingly to these measured torques.

Figure 24 a, b and c show the interchange able binding-version with a rubber elastic tape 64, which is attached on the left- and right-hand-side of the spring box on the fastening respectively suspension plate 41 as step-in guide and direct toe-boot-tip-board-edge connection. For respectively while the step-in the snowboarder pulls this rubber elastic tape 64 with the boot-tip backwards until the release mechanism is locked as then the rubber elastic tape will move forward again under the boot tip. This rubber elastic tape is also used, because it can always press away any snow below the boot-sole.

Figure 25 is a perspective view of the bottom-part 3 of the interface 1 with the fastening respectively suspension plate 41 and a number of rubber elastic spacer washers 39 as damping elements with the screws in the holes 43. With this combined suspension- and damping-system is a slight angular adjustment and the damping tension of the fastening respectively suspension plate 41 possible. So the fastening respectively suspension plate can be adjusted to the right "canting" and "heel" for especially hard-boot-riders, because any preload on the release mechanism must be reduced or even excluded, so that no false inadvertent releases happen. Furthermore the suspension- and damping-system reduces shocks and hits on the joints and limbs, as well as on the release mechanism itself.

Figure 26 shows a second SNAB-System safety release mechanism with inward on a central round unit with grooves pressing pins for an improved so called or known "Meyer" binding.

Figures 27a and 27b show a snapping step-in respectively pull-out mechanism for an inward on a (interface) plate pressing release mechanism with a turn able groove plate 28 for an improved so called Miller Z-Binding. This is a different kind of a safety binding for a ski or a snowboard as universal mounting interface plate, wherein a step-in mechanism alike the clapping mechanism with the turn able groove plate 28 of the release mechanism can be mounted on the kick plate of the Miller Z-binding. The fastening lever 29 of this step-in mechanism can have a lever for release

respectively opening the step-in mechanism. An elastic retention element can keep this lever in the locked position. The lever can be on both sides left and right as well as rear and front and is shaped that it gives for stepping in with the boot a guide to the boot.

Figures 28a and 28b show in side and in top view a release (interface) plate for under a boot with a dynamic damping system for not interfering with the flex of the ski and a hole or opening over the release and step-in mechanism for that snow or ice can be pressed upwards out of the plate and the release and step-in mechanism when stepping in. A release lever 103 with a little groove for the ski pole at the end of the spring box can be pressed down with a ski pole for opening the release mechanism and for stepping out. The same lever locks the spring box when stepping in by pressing down the boot and the (interface) plate with the spring-box on the binding respectively ski. The release mechanism system in the (interface) plate can also be attached to the boot, where the pins with the spring-box 101 are pressing into the cavities are not only in a plane, but the pins can rotate in the cavities either around an axis going through the middle of the pins round head 102 or trough a central axis or an axis going through the top of the pin 104! This release mechanism system in the (interface) plate, which can be mounted under any boot can be released from the ski by a lever (103) with a ski pole and locked again by this lever, when the sportsman is pressing down the boot with the plate on the binding on the ski! With this system it is possible to get a dynamic damping system for the boot sole for not interfering with respectively supporting the flex of the ski while carving. This (interface) plate, which is attached to the boot has a hole or opening 105 in about the size or diameter of the release mechanism for pressing any snow or ice upwards out of the plate through the openings in the soles (in the middle) of the ski- and snowboard- boots. Last but not least the release mechanism can be put under any free-style- or other step in or plate binding! I.e. the interface plate (with the release mechanism) is connected and or joint together to the free-style or other step-in or plate binding! This universal mounting plate has two lateral pins 106 for attaching it to a ski touring-binding respectively it has an axis integrated for the fastening to a touring-binding or to a snow-boot.

Figure 29 shows a power plate 107 with wings 108 for multiple biomechanical, fashion or other functional (power control, -transferal, change of release torques) purposes. The power plate can be attached around left and right or under the interface plate. The wings can rotate around the power plate and interface.